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for movement of objects in the water, for movements of the operator, for jarring the vessel in which they were. There was no evidence of ability to discriminate patterns, altho they discriminated the shape of objects, such as a dobson-larva.

Their behavior is stereotyped. The associations are few and simple—such as relate directly to their life struggle. They were able to learn nothing as complex as passing thru a definite opening to secure food. The associations are fairly permanent, lasting as long as 42 days. They are more difficult to modify than to establish at the outset.

AGE AND FERTILITY IN FOWLS

Pearl (Proc. Nat. Acad. Sci., 1917, 3, p. 354) compares the cycle of progress in the fertility of mammals and poultry. In mammals fertility seems to begin below the maximum, increase, and then decline until sterility is reached. In fowls the maximum seems to occur at the first breeding season—when the combined age of the parents at mating is only two years. There is a strong drop from this to the point where the sum of the ages is three years. From three to four there is little change. In passing from this period to a combined parental age of five years there is another large drop.

The same author (Genetics, 1917, 2, p. 417) formulates a fertility index which represents a practical measure of the reproductive value of mated pairs of domestic fowls. This is that percentage of the maximum total number of chicks physiologically possible, which any given mating shows. It includes the total number of chicks produced which are capable of living three weeks after hatching. In the rapid decline in fertility expressed above, the rate of decline is more rapid in the male than in the female.

SEX RATIO IN CHICKENS

Pearl (Science 1917, 46, 220) states that the normal per cent of cockerels is 48.57. It seems that this ratio is correlated with the laying ability of the hens. In hens which have been bred and selecte to a high egg productivity, a still larger proportion of pullets is produced.

NEW PROCESS OF KEEPING FISH BY BRINE FREEZING

Gardiner and Nuttall (Proc. Cambr. Phil. Soc. 1918; 19:185) give an account of a brine freezing process at high temperature which pro-

duces no breaking down of muscle, nor loss of aroma or flavor. The brine is of 18% salt. A temperature of 5°-20° F. will serve to freeze a large fish in three hours; a herring in twenty minutes. The better preservative results are due to the fact that in ordinary freezing large ice crystals are formed in and among the muscle fibres. This breaks up the texture of the flesh. In the brine freezing the tissues are unchanged because only small crystals are produced.

FOOD OF YOUNG FISHES

Lebour (Jour. Marine Biol. Assoc. 1918, p. 433) states that some very young fish eat diatoms and other single celled organisms before they begin to eat animal food in the plankton. By a study of some fifty species she concludes, however, that all except a few vegetarian fishes, depend upon the small animals of the plankton rather than upon the algae. These food animals are Cladocera, Copepods, cirriped larvæ, and eggs. These crustacea feed freely on the microscopic plants.

STIMULI AND REACTIONS OF SAND CRAB

Mead (Univ. Cal. Zool. Publ. 1917, 16) reports experimental studies upon the sand crab so abundant on the tidal beaches of California. He found that the range of stimuli to which they are adapted is quite limited. Their eyes are effective, and guide them to their feeding beds and in the avoidance of enemies. Their feathery antennae aid them in capturing small organisms for food.

Their most striking reactions are in burrowing when uncovered, and in making their way back to the water when out of it. Two tendencies aid in the latter reaction; (1) they tend to run down slopes; (2) when not further than 200 feet from the ocean they tend to go toward it, even when they cannot see it. Even tho near the ocean they will, however, follow a 7 per cent slope away from it.

REACTIONS UNDERLYING THE DIURNAL MIGRATIONS OF VARIOUS PLANKTON ANIMALS

Esterly (Univ. Cal. Zool. Pub., April 4, 1919) reports experimental studies of the behavior of various plankton animals in the laboratory, conducted with the purpose of determining the factors that account for their diurnal migrational habits in nature. The author calls